

RISK ASSESSMENT ANALYSIS FOR THE CITY OF FITCHBURG, MA

EXECUTIVE ANALYSIS OF FIRE SERVICE OPERATIONS IN EMERGENCY MANAGEMENT

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ABSTRACT

It is critical for any community fire department to have the ability to control a target hazard. A department must also have the appropriate resources and training to be able to prioritize the necessary actions in any emergency. Therefore, departments must prepare a risk assessment of vulnerable target hazards within its community. The Fitchburg Fire Department (FFD) had experienced two such hazards within the last 10 years, a microburst and a chemical plant explosion, and have since realized the urgent need for a disaster preparedness plan to deal with such emergencies. The current Chief understood the needs of the community and the importance of establishing a plan before another disaster strikes.

The problem that prompted this research was the recognition that the FFD's policies should be revamped to identify the need for disaster preparedness planning through risk assessments of potential target areas. The existing modes of preparedness for this community is limited to hospitals and schools, but the resources required to meet a critical risk situation have not been fully analyzed.

The purpose of this project was to examine and identify disaster planning needs and possible threats posed to the FFD resources.

The principle procedures employed were an analysis of historical and literature data, a survey of fire departments throughout Massachusetts, and a review of the guidelines contained in the Executive Analysis of Fire Service Operations in Emergency Management course (EAFSOEM). The intent was to gain from the research material an insight into disaster preparedness planning techniques that other organizations found to be effective, and how many were in place.

Evaluative research supported by descriptive and historical methodologies were utilized to conduct a survey (see Appendix A) and to answer the following questions:

1. Is a disaster preparedness plan needed in the FFD?
2. Do other fire departments use risk assessments in their disaster preparedness plans?
3. What impact will a large target hazardous incident have in the city of Fitchburg?
4. Does the FFD have the resources necessary to meet a critical risk incident?

The results of the survey clearly indicated that 59 departments (86%) have a disaster management plan in effect or have made a risk assessment. Research also showed that many departments in Massachusetts, especially smaller departments, have conducted a capability assessment of their department and has some type of contingency plans for target hazards in their community.

The survey also found that 69 departments (100%) agree that a disaster management plan is required. A total of 60 departments (87%) believe that they do not have the capability to handle a target hazard, and that it could only be done with mutual-aid resources, while nine departments indicated they could handle such an emergency. The findings of the research indicated that a vast majority, 53 departments (77%), have a contingency plan for the community itself.

The conclusion reached by the author was that an effective and efficient disaster preparedness plan with provisions of available resources must be developed for the FFD. We have learned through surveys that Fitchburg is not the only community unaware of the risks they face. Many fire departments are unprepared to respond with appropriate resources to large target hazards.

Recommendations for improvement would include:

- 1) Identify potential disasters from target hazards through risk assessment analysis.
- 2) Plan for expanded mutual-aid response.
- 3) Activate the Incident Command System (ICS) in the FFD to manage emergency incidents effectively.
- 4) The Federal Emergency Management Agency (FEMA) Preparedness Handbook Guide and the Comprehensive Management Plan (CMP) should be updated and implemented within the department.
- 5) The completion of risk assessment analysis worksheets to determine the probability of occurrence, vulnerability, and the level of risk for the community.

The FFD must prepare itself to prevent such incidents yet be ready to respond appropriately if such incidents do occur. It is the fire department's critical role to deliver the necessary services to the community it serves.

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INTRODUCTION

The city of Fitchburg is located 50 miles northwest of Boston, Massachusetts, and has a fire department of 100 men operating out of three stations. We protect approximately 26 square miles and a population of 42,000 year-round citizens living in an old mill city where many of the mill-constructed buildings were turned into apartment complexes. The city also includes a state college, and protects up to 20,000 full- and part-time students each year. The Fitchburg Fire Department (FFD) responds to close to 7,500 incidents a year, 65% of which are emergency medical. Fitchburg does not have a specific disaster preparedness plan for the community in place, except for guides prepared by the Federal Emergency Management Agency (FEMA) and the Comprehensive Management Plan (CMP).

The guides are primarily for the use and review of state and local emergency operations agencies that focus on preparedness and response planning considerations. The information in the guide was taken from 17 Federal Government publications, including the civil defense guide. Included with the FEMA guide is a handbook for the local government titled “Disaster Operations.” This guide, dated July 1981, is still used in conjunction with FEMA’s guide. Although there are minimal planning procedures in place, the majority of the FFD is not fully aware of their role in the response or knows of its existence.

Fitchburg has several potential risks including a large number of chemical processing companies that could have devastating effects on the community and the department. In 1995, Chem-Design Corporation, a local chemical company, had a large explosion caused by welding. Three firefighters and seven employees of Chem-Design were injured. At that

time, the FFD had no disaster preparedness plan and had to go beyond mutual-aid resources to help combat the incident, such as State HAZ-MAT Team and locating a company chemist to assist at the scene. Although Chem-Design had several similar incidents previously, they were not as devastating or confusing.

On December 31, 1988, 14 firefighters were sent to the local hospital for possible chemical poisoning after a chemical dryer fire explosion. All firefighters were treated and released. It is incidents such as these that can deplete resources needed to handle a significant hazardous material incident. The increase in hazardous material production by local companies present a real threat to not only firefighters but the public as well.

The paramount concern with any of these incidents is that they could go beyond the capabilities of the FFD and possibly beyond what other agencies could provide. As stated, fire departments have high levels of commitment; they have the ultimate responsibility for the outcome of the incident and are committed to saving lives and protecting property. These emergencies usually involve above average resources, therefore it is important that departments evaluate their ability of handling hazardous situations.

Incidents happen quickly and reactions need to be fast and decisive. To insure any department's success, the use of risk assessments can help to evaluate command presence. The ultimate test is extremely difficult if resources are depleted at a major incident. The FFD must be capable of providing necessary resources, such as mutual-aid from surrounding communities, and establishing local resources from private industry.

The purpose of this project was to examine and identify disaster planning needs and possible threats posed to the FFD resources.

The principle procedures employed were an analysis of historical and literature data, a survey of fire departments throughout Massachusetts, and a review of the guidelines contained in the Executive Analysis of Fire Service Operations in Emergency Management course (EAFSOEM).

The intent was to gain from the research material an insight into disaster preparedness planning techniques that other organizations found to be effective and how many were in place.

Evaluative research supported by descriptive and historical methodologies were utilized to conduct a survey (see Appendix A) and to answer the following questions:

1. Is a disaster preparedness plan needed for the FFD?
2. Do other fire departments use risk assessments in their disaster preparedness plans?
3. What impact will a target hazard incident have in the city of Fitchburg?
4. Does the FFD have the resources necessary to meet a critical risk incident?

Chem-Design Corporation is the main focus in this research as it is the largest risk assessment in our city. From this we hope to build upon the findings so the FFD will have a better understanding of the risk and commitment involved.

BACKGROUND AND SIGNIFICANT

Over the years the Fitchburg Fire Department's (FFD) main concern was fighting fires and providing emergency medical services as well as rescue operations. But as time went on, the need for new advances in plastic and chemical compounds increased, and consequently so did the hazards that evolved.

Fitchburg was an old mill city that produced paper and textiles. At the turn of the century there was a decline in production due to new and improved machinery and the competition of cheaper labor forces in the southern states. For many years, these buildings did not upgrade to comply with the newer building codes. The cost of remodeling was so expensive that most of the companies closed or moved out of state, leaving many of these mill-constructed buildings empty. Fitchburg was then headed toward a new era, the production of plastic, which brought in new hazards for the fire department.

Companies were developing much needed as well as exotic chemicals that businesses required for special processes. The FFD has the capability to control a fire in one or two structures with a second alarm response, but beyond that resources are insufficient and mutual-aid is relied upon to fill the need. Numerous chemical and manufacturing companies are now producing multiple hazardous substances, which in turn increases the hazardous material incidents in Fitchburg.

From 1988 to 1998, the city has had 118 incidents related to hazardous materials in one chemical company, Chem-Design Corporation. Vulnerability to the hazard becomes apparent and creates a risk to firefighters who are required to lessen the incident. With the number of

incidents increasing, the number of injuries also increases, drawing attention to the problem. Hazardous material incidents and structural firefighting require different types of operation, and firefighters recognize the difficulties associated with dangerous structural firefighting situations as opposed to problems associated with hazardous material incidents.

During a hazardous materials (HAZ-MAT) incident in 1988, 14 firefighters were transported to a local hospital for possible chemical poisoning caused by a chemical dryer fire explosion. All firefighters were treated and released. In 1995, another explosion caused from welding operations occurred. Three firefighters and seven employees were injured, with two employees in serious condition. The FFD did not have a disaster preparedness plan or standard operating procedures for such incidents in place at that time, which created a more dangerous emergency than it should have been.

The experience and lesson learned from these and other similar incidents caused the FFD to rethink the standard response to such incidents. The department has had some training in the Incident Command System (ICS), but is not using the ICS system. The department has issued a standard operating procedure (SOP) for responding to Chem-Design Corporation. Due to the number of incidents at Chem-Design, we have had in-service drills simulating possible disasters. Chem-Design, teamed with the FFD, built a command center for such incidents using radios, maps, and computers itemizing all chemicals Chem-Design utilizes on a daily basis. One major problem with this scenario is the location of the command center in relation to the company. Chem-Design is located in the western part of the city, approximately five miles from Central Fire Station. The company is located on top of a hill, at an approximate 175-foot elevation, with prevailing

westerly winds (see Appendix B). The command center is located near the bottom of the hill, approximately ¼ mile from the main plant and 300 feet across the street from the Chem-Design storage facility.

If a large HAZ-MAT incident were to occur, the prevailing westerly winds could render the command center useless. Some of the chemicals produced at Chem-Design could call for an evacuation of one mile or more. It is for these reasons that the FFD must plan for the unexpected to effectively handle any emergency and to have all the resources necessary.

The problem that prompted this research was the recognition that the FFD should be revamped to identify the need for disaster preparedness planning through risk assessments of potential target areas. The concern for disaster planning is directly related to the EAFSOEM course unit risk assessment in SM 4-1.

The purpose of this project was to examine and identify disaster-planning needs and the possible threat posed to the FFD resources. As outlined on page SM 4-30 of the EAFSOEM course, risk assessments will provide a systematic approach for a well-designed process that helps planners and others to:

- conceptualize and understand hazards faced by the community;
- identify possible mitigation measures;
- document results of the decision-making process;
- communicate possible risks with officials and the general public.

LITERATURE REVIEW

A review of literature and group research projects from the National Fire Academy (NFA) and other sources have clearly demonstrated an increasing concern for disaster planning. The city of Fitchburg had experienced several emergency incidents that involved hazardous materials that greatly heightened our awareness.

The concern for disaster planning is directly related to the NFA Executive Fire Officer EAFSOEM course unit four, community risk assessment, and unit six, capability assessment. The student manual states that a hazard assessment is conducted to evaluate the risk posed to the city and the fire department from hazardous materials. It also states that although a number of disaster-planning procedures appear to be in place, many of the fire departments are not fully aware of their role in the response.

The purpose of this literature review was to analyze the findings and experiences of the other fire departments related to hazardous material incidents and to make possible recommendations from these findings. Research found that in large incidents of disaster situations, fire service personnel and resources were depleted with no disaster preparedness planning in effect to recall additional resources (see Appendix A2).

The Federal Emergency Management Agency (FEMA) states that, “the key to effective emergency management is a rapid, well planned response. The Preparedness Directorate coordinates training, exercises, and response planning at federal, state and local levels. These activities insure that when a disaster strikes, emergency managers will be able to provide the best response possible” (FEMA 1998, p. 1).

Consequently, there are many agencies in the state, federal or private industry that are willing to help fire departments respond to hazardous incidents with proper training and planning procedures. The National Fire Academy (NFA) provides courses or classes and additional materials pertaining to disaster preparedness planning.

“Adequate training of everyone who will be involved in an emergency response is crucial to its success. Fortunately, such training is readily available at little or no cost to the local community” (Forbes, 1996, p. 21). Forbes goes on to say that, “the Massachusetts Emergency Management Agency (MEMA) also conducts courses or classes in running Emergency Operation Centers, the Incident Command System and a number of ‘Train the Trainer’ courses” (p. 22).

The FFD had very little time to become experts or experienced in the area of HAZ-MAT technology, and did not have a strategy to follow. There were no training programs or classes before the incidents occurred at Chem-Design Corporation that would have prepared the department towards proper procedures in containing such incidents.

The effectiveness of response during emergencies depends on the amount of planning and training performed...If management is not interested in employee protection and in minimizing property loss, little can be done to promote a safe workplace. It is therefore management’s responsibility to see that a program is instituted and that it is frequently reviewed and updated (OSHA, 1998, p. 16).

In approximately April 1997, the FFD implemented a standard operating guideline (SOG) for emergency response procedures for Chem-Design Corporation. The SOG is used for any response made to Chem-

Design incidents. It outlines the basic operating principles to be employed for any situation. As mentioned, it is only basic.

Roberts (1995) found the following:

response to hazardous material incidents is a relatively new field for most fire departments, however, it falls within the scope of emergency response...Again, risk assessment plays an important part in allowing fire department managers the ability to assess the risk to the community and determine if appropriate resources are available to alleviate the potential problems that may arise. (p. 10)

The complexity of a hazardous material incident complicates the activities required to have a controlled or coordinated operation. The members of the department had basic training in the incident command system (ICS) in 1993, but the department has yet to implement the system in full. The use of common terminology, span of control and unified command structure are only some of the reasons why ICS organizational structure should be developed and implemented. Risk assessment is an important part of the emergency planning process and should be developed with the ICS to be an effective process as mentioned above by OSHA and Roberts.

“Agencies that have used ICS for many years and have been exposed to numerous large scale incidents seem to find the formation of predesigned incident management teams the next logical step in increasing preparedness for large-scale, all risk incidents” (Miller, 1995, p. 12).

Harper (1995) adds, “to prepare for hazardous material incidents local agencies need comprehensive response plans. Businesses, especially those with a serious life hazard, need evacuation and shelter in place plans.”

Harper confirms that training is an important part of the preparation. Many

of the aspects of each disaster can be practical in the scope of one or two scenarios (p. 15).

Training is essential for effective performance, and it is only with a comprehensive training program that the FFD will be able to establish and maintain a competent and well-trained force. In the past few years, the department initiated a “Mass Causality Incident Drill” to be held yearly with Chem-Design. During each drill, members of the company and department come to understand the importance of working together for a safer environment.

Gardner (1995) agrees, stating that, “there is a continuing need to emphasize the importance of risk management planning for responders and code enforcement personnel...It is apparent that some type of risk management plan program is necessary for facilities that store, use and/or handle hazardous materials” (p. 15).

The department could evaluate the probability and consequences of possible HAZ-MAT incidents as a first step in community risk assessment by using Chem-Design to focus attention on risk assessment.

“Local government executives and community leaders should have done some planning on who would do what if the community is threatened or hit by various types of disaster. They should also test these plans in exercises that simulate different kinds of disaster in which these key leaders would be the community’s top decision-makers” (FEMA, 1981, p. 4).

The FFD has limitations in operations at incidents involving hazardous materials. Due to the limitations in training, protective equipment, and manpower resources, operations at these incidents prevent the department to conduct safe operations and control without an effective plan.

In the EAFSOEM (1997) it states:

It is important to remember that even a quantitative risk assessment relies on judgments, assumptions, and simplifications...However, a risk assessment provides a systematic approach for evaluating complex phenomena, and a method to apply the results for emergency decision making. There is no one right way to go about conducting a risk assessment (SM 4-30).

PROCEDURES

The focus of this research was to determine the vulnerability of the FFD in handling a hazardous material incident with proper disaster preparedness planning through Risk Assessment.

The first step was to determine if a potential risk threatens the community by answering the following worksheets:

1. Comprehensive FEMA Hazard List (SM 4-17) (see Appendix C)
2. Vulnerability Assessment Matrix (SM 4-27) (see Appendix D)
3. Risk Rating Matrix (SM 4-29) (see Appendix E)

The next step involved a survey (see Appendix A) of departments throughout Massachusetts of comparable size and population to the city of Fitchburg.

The final portion of the research involved putting into context the FFD's problems and determining if the department could handle a hazardous material incident with its available resources and the need for disaster preparedness plan.

Comments received from the survey indicated that a large percentage (65%) of departments did not have a risk analysis for their community.

Definition of Terms

Hazard/Hazardous: Capable of posing an unreasonable risk to health, safety, or the environment; capable of causing harm.

Hazardous Material: A substance (gas, liquid, or solid) capable of creating harm to people, the environment, and property.

Incident: An emergency involving the release or potential release of a hazardous material, with or without fire.

Incident Management System: An organized system of roles, responsibilities, and standard operating procedures used to manage and direct emergency operations. Such systems are sometimes referred to as incident command systems (ICS).

Response: That portion of incident management in which personnel are involved in controlling (defensively or offensively) a hazardous materials incident. The activities in the response portion of a hazardous materials incident include analyzing the incident, planning the response, implementing the planned response, and evaluating progress.

Should: Indicates a recommendation or that which is advised but not required.

Assumptions and Limitations

It was assumed that all department chiefs surveyed had adequate knowledge of their communities and fire departments to answer the survey accurately. It was also assumed, that each department chief surveyed would answer honestly and completely.

A limiting factor was that out of the 80 departments surveyed, a total of 69 departments completed and returned the survey, creating a balance of 11 unanswered.

RESULTS

Answers to Research Questions

Research Question 1. Is a disaster preparedness plan needed in the FFD? Fitchburg does not have a specific disaster preparedness plan for the community except for guides prepared by the Federal Emergency Management Agency (FEMA) and the Comprehensive Management Plan (CMP), which is a state-driven document from MEMA. The guides are primarily for the use and review of state and local emergency operation plans that focus on preparedness response planning considerations. A few departments surveyed stated that CMP is too large and nearly useless.

Although there are minimal planning procedures in place, most, if not all, of the FFD is unaware of their role in the response or of its existence. The guides have some good qualities and approaches for a disaster, but must be updated to correspond with today's available resources. The survey found that 59 departments (86%) have a disaster management plan in effect and indicated that it should be continuously updated.

The student manual clearly states that, "Planning is a process, not simply a document. In developing the plan, members of the community work together to identify problems, determine priorities, allocate resources, assess capabilities, and so forth. No single approach is appropriate for all jurisdictions" (SM 4-10).

Research Question 2. Do other fire departments use risk assessments in their disaster preparedness plan? The Fitchburg Fire Department (FFD) and 65% of departments have not done a risk assessment for their community or a capability assessment of their department for their disaster preparedness plans. A small percentage indicated they were in the process of doing so, while others had no comments.

The EAFSOEM course has shown that risk assessment provides valuable information for departments in planning, priority setting, and strategy development. Many departments have mentioned the need to establish a plan that clearly will not be beyond the capabilities of each community to effectively handle a disaster. They also felt it could only be done with risk assessment analysis. As mentioned above, most departments were in the process of doing a risk assessment of both the community and its department. Fitchburg should be part of the same process.

Research Question 3. What impact will a large target hazard incident have in the city of Fitchburg? Fitchburg has not done a risk assessment of its community or department. Past incidents have shown the need to insure that vulnerability to the department and community will be kept at a minimum. There have been civilians and firefighters injured at these incidents, confirming the need to plan ahead, of establishing a disaster management plan and training and educating the department of the hazards.

The student manual states:

Hazard assessment information identifies which hazards are most likely to occur, how frequently they may occur, and how severe their physical and/or biological effects may be. Although no hazard is entirely predictable, the recurrence of certain hazards...generally is

better understood than the timing of major earthquakes, high rise fires or conflagrations (SM 4-7).

The student manual also explains how risk assessment starts by dividing hazards into two components: exposures and effects. Incidents at Chem-Design were minor to major in the last ten years. The most serious of these occurred in 1995 when seven civilians and three firefighters were injured during an explosion at the plant. This exposure could have triggered other explosions in the chemical process that could have covered an area of one-half mile or more. The effect from the explosion showed how the FFD depleted its own resources trying to control the incident and resorted to mutual-aid and an HAZ-MAT Team from central Massachusetts.

The vulnerability assessment matrix of this hazard rated twelve (12) points, indicating a high vulnerability out of fifteen (15) points (see Appendix F).

Research Question 4. Does the FFD have the resources necessary to meet a critical risk incident? We have learned through surveys that Fitchburg is not the only community unaware of the risks they face. Many fire departments are unprepared to respond with appropriate resources to large target hazards.

Over 59 departments (86%) were unable to handle or deal with a target hazard without the assistance of mutual-aid. Only 9 departments (13%) indicated they could handle any type of emergency with no further assistance. They made no comments as to how this could be done. One hundred percent of the departments throughout Massachusetts have mutual-aid plans in place.

In the survey, departments were asked if they had a Rapid Notification System for local residents near the target hazard. A total of 57 departments (83%) had a system in place, while (17%) had no formal notification except for using the local police, phones, and a door to door system. No one department had a unique system in place.

The position the FFD and surrounding communities must take is best summed up in the student manual:

The community must respond to any hazard situation until the risk is completely removed. This may take considerable time, so the community is saddled with the need to plan for and to devote resources to deal with the risk. Risk assessment forces the community to consider what it cares about, and who should bear the burden of living with, or mitigating a problem, once it has been identified.

(SM 4-32)

The capability assessment is another important part in being prepared to deal with a disaster situation. Knowing the hazards of the community is useless unless you know how capable you are of dealing with them. The capability assessment will help the department understand its strengths and weaknesses so they can be appropriately acted upon.

DISCUSSION

The initial goal of this project was to identify the need for disaster preparedness planning through risk assessments of potential target areas. From the study, every fire department should have a disaster plan developed

that takes into account many disaster situations that could occur within its community. Planning evaluation of potential risks and identification of what hazards may occur is extremely important. The student manual states that, “To enable you to complete a risk assessment process by identifying critical hazards within your community, assessing community vulnerability, and rating the risks accordingly for prioritizing planning concerns” (SM 4-39).

During a ten-year period, from 1988 to 1998, the city has had over 100 incidents related to hazardous materials in one chemical company. The department, during larger incidents, was not capable of handling or controlling a hazardous material incident that was beyond available resources.

This clearly shows that the Fitchburg Fire Department (FFD) drastically needs a risk assessment of the community, so that future incidents are handled efficiently.

The survey has shown that over 87% of departments, based on their continents plans, are not prepared to effectively handle or deal with their target hazards within their community using current resources. The only way that many departments could control or contain most hazardous material incidents is to implement mutual-aid with additional outside resources such as an HAZ-MAT Team.

It was also shown through implications of the literature, survey data, and past incidents that the current FFD disaster preparedness plan is inadequate and should be revamped. This would allow us to ascertain a probability of occurrence for each disaster, and enable the potential life and property risk factors to be evaluated.

Over the past few years, some gains have been made to increase the department’s awareness through training drills. Although not as

comprehensive as they should to be, the department has been trying to work with local chemical companies to become aware of possible hazards.

We need to provide the basic principles of standardized procedures and terminology of the ICS, and to provide the community with a mutual-aid system that will not be depleted or exhausted in a very short amount of time.

Lastly, drills for all personnel are an essential part of the planning process and it will familiarize all firefighters in the overall operational process.

RECOMMENDATIONS

In order for the Fitchburg Fire Department (FFD) to effectively serve its community, it is important for the department to identify any situations that could become a potential disaster.

The FFD should play a vital role in the development of emergency plans and handling hazardous incidents. But before any plans can be implemented, it is more important to ascertain the needs of the department to effectively insure the safety of the community. Therefore, the following recommendations are submitted for consideration:

1. The department should complete the following worksheets to determine the probability of occurrence, vulnerability, and the level of risk for the community:
 - a) Comprehensive FEMA Hazard List (see Appendix C)
 - b) Vulnerability Assessment Matrix (see Appendix D)

c) Risk Rating Matrix (see Appendix E)

2. A capability assessment for the department should be completed to ascertain the strengths and weaknesses of the department to insure the weaknesses can be dealt with and overcome.
3. The department should do a risk assessment of the community to focus attention on high hazard target areas. Past experience dictates that chemical incidents in the community over the past ten years have been increasing. Although no hazards are predictable, the reoccurrence of incidents at Chem-Design could be a prequel to a disaster.
4. Develop and implement a backup plan to relocate the existing command center to a safer location.
5. An evaluation of mutual-aid resources should be made by conducting an annual large-scale chemical hazard scenario to determine sufficient suppression levels.
6. Activate the standard operating procedure (SOP) for the Incident Command System (ICS) in the department to allow standardization through this system to manage emergency incidents effectively.
7. The Federal Emergency Management Agency (FEMA) Preparedness Handbook Guide and Comprehensive Management Plan (CMP) should be updated and reduced in size so it may be used as a quick reference guide when needed. Then implement the plan within the department so

all members know their responsibilities and functions during an emergency operation.

The survey clearly indicates that over 91% of fire departments feel that a risk assessment should and must be done to plan and prepare the department for possible hazardous material incidents.

The FFD and 87% of departments are unable to handle or deal with target hazards without using some type of contingency plan. A plan is needed to effectively work with mutual-aid resources in order to deal with such disasters before they happen.

In conclusion, if a fire department is properly prepared, it won't be easily surprised. Therefore, it is extremely important that the department function efficiently during times of stress by careful development and evaluation of its risk assessment. Ultimately these recommendations will be beneficial and a positive step for the department, as well as the community which it serves.

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APPENDIX A
EMERGENCY PREPAREDNESS SURVEY

Name of department _____

Is your department: Volunteer _____ Career _____ Combination _____

Population served _____

Area protected _____

Number of fire stations _____

Number of engine companies _____ Number of truck companies _____

1. Does your community have a disaster management plan in effect?

Yes _____ No _____

If yes, is the plan: Local _____ State _____ Federal _____ Combine State/Local _____

2. Have you done a risk assessment in your community? 2b. Is a risk assessment necessary?

Yes _____ No _____ Yes _____ No _____

3. Have you done a capability assessment of your department?

Yes _____ No _____

4. Do you have contingency plans for target hazards in your community?

Yes _____ No _____

5. Based on your contingency plans, are you able to handle or deal with your target hazards?

Yes _____ No _____

Comments _____

If No, what provisions have you made in an event of an incident?

6. Are Mutual-Aid plans in place?

Yes _____ No _____

If No, what alternatives? _____

7. What is the worst target hazard in your community? Ex: chemical company, PCBs,
Industrial process

8. Is there Rapid Notification System for local residents near the target hazard?

Yes _____ No _____

What type of system is used?

Please use back for additional comments

APPENDIX A-1
EMERGENCY PREPAREDNESS SURVEY

Name of department _____ 69 TOTAL _____

Is your department: Volunteer__0__ Career__57__ Combination __12__

Population served__13,500 to 120,000 _____

Area protected_____ 4.66 to 103 sq. miles_____

Number of fire stations_____ 1 to 6_____

Number of engine companies__2 to 6__ Number of truck companies__1 to 2__

1. Does your community have a disaster management plan in effect?

Yes____59_____ No____10_____

If yes, is the plan: Local__45__ State__12__ Federal__2__ Combine State/Local__11__

2. Have you done a risk assessment in your community? 2b. Is a risk assessment necessary?

Yes____24_____ No____45_____ Yes__63__ No__6__

3. Have you done a capability assessment of your department?

Yes____20_____ No____49_____

4. Do you have contingency plans for target hazards in your community?

Yes____53_____ No____16_____

5. Based on your contingency plans, are you able to handle or deal with your target hazards?

Yes____9_____ No____60_____

Comments_____

_____59_Departments_said_yes_with_Mutual_Aid_____

_____10_Departments_said_no_not_at_all_____

If No, what provisions have you made in an event of an incident?

6. Are Mutual-Aid plans in place?

Yes____69_____ No____0_____

If No, what alternatives? _____

7. What is the worst target hazard in your community? Ex: chemical company, PCBs,
Industrial process

8. Is there Rapid Notification System for local residents near the target hazard?

Yes____12_____ No____57_____

What type of system is used? Door to door, phones, police, air horns, phone dialers, etc.

Please use back for additional comments

APPENDIX A-2
EMERGENCY PREPAREDNESS SURVEY

Name of department _____ 83% Responded 17% No response _____

Is your department: Volunteer__0__ Career__83%__ Combination __17%__

Population served _____

Area protected _____

Number of fire stations _____

Number of engine companies _____ Number of truck companies _____

1. Does your community have a disaster management plan in effect?

Yes____86%_____ No____14%_____

If yes, is the plan: Local__65%_ State__17%_ Federal__3%_ Combine State/Local__15%_

2. Have you done a risk assessment in your community? 2b. Is a risk assessment necessary?

Yes____35%_____ No____65%_____ Yes____63%__ No____9%__

3. Have you done a capability assessment of your department?

Yes____29%_____ No____71%_____

4. Do you have contingency plans for target hazards in your community?

Yes____77%_____ No____23%_____

5. Based on your contingency plans, are you able to handle or deal with your target hazards?

Yes____13%_____ No____87%_____

Comments _____

_____86%_Departments_said_yes_with_Mutual_Aid_____

_____14%_Departments_said_no_not_at_all_____

If No, what provisions have you made in an event of an incident?

6. Are Mutual-Aid plans in place?

Yes____100%_____ No____0_____

If No, what alternatives? _____

7. What is the worst target hazard in your community? Ex: chemical company, PCBs,
Industrial process

8. Is there Rapid Notification System for local residents near the target hazard?

Yes____17%_____ No____83%_____

What type of system is used? Door to door, phones, police, air horns, phone dialers, etc.

Please use back for additional comments

Topographic map of the Fitchburg, Massachusetts area. The map shows contour lines, roads, and various landmarks. A hand-drawn arrow labeled "Chem Design" points to a location near the center of the map, between Waites Corner and the Wachusett Station. The map includes labels for "Fitchburg River", "Snow Hill", "Sawmill Pond", and "Palmer Hill". A grid with coordinates is overlaid on the map.

APPENDIX C

	Could this hazard affect your jurisdiction?	Is this hazard a significant threat to your jurisdiction?	About how often does this hazard occur in your jurisdiction?	What is your best estimate of the total population that could be affected seriously by this hazard?
NATURAL HAZARDS				
Avalanche				
Drought				
Earthquake				
Flood				
Hurricane/Tropical storm				
Landshift/Erosion/Earthslide				
Tornado				
Tsunami				
Volcano				
Wildfire				
Winter storm (severe)				
Epidemic				
High wind				
TECHNOLOGICAL				
Civil Disorder				
Dam Failure				
Haz Mat (stationary)				
Haz Mat (transportation)				
Nuclear Facility				
Power Failure				
Subsidence				
Transportation Accident				
Urban Fire/Conflagration				
Air Disaster				
Rail Disaster				
Other				
NATIONAL SECURITY HAZARD				
Attack				
- Conventional				
- Nuclear				
- Chemical/Biological				
- Sabotage				
Terrorism				
- Nuclear				
- Chemical/Biological				
- Public Utility Disruption/Contamination				
TARGET HAZARDS				
Agricultural hazard areas				
- Blight				
- Infestation				
- Severe weather				
Arsenals				
- Armories, storage centers				
- Military manufacturing centers				
Civil disorder-prone areas				
- Campuses				
- Prisons				
- Special population concentrations				
- Terrorist targets				

Figure 4-2
Comprehensive FEMA Hazard List

Matrix 2--Vulnerability Assessment

HAZARDS					
Impact Rating					
Danger/Destruction (High=3; Moderate=2; Low=1)					
Economic (Permanent=3; Temporary=2; Immediate short term=1)					
Environmental (High=3; Moderate=2; Low=1)					
Social (High=3; Moderate=2; Low=1)					
Political Planning Level (Local=1; Regional=2; Federal=3)					
Total Vulnerability Rating (Sum of all factors)					
RANK					
5 to 8 LOW					
9 to 11 MODERATE					
12 to 15 HIGH					

APPENDIX E

Matrix 3--Risk Rating

[illegible]

Matrix 2--Vulnerability Assessment
FOR FITCHBURG, MA.

HAZARDS	CHEMICALS	FIX FACILITY	TRANSPORTATION	TERRORIST	HURRICANE
Impact Rating					
Danger/Destruction (High=3; Moderate=2; Low=1)	3	2	3	1	3
Economic (Permanent=3; Temporary=2; Immediate short term=1)	3	3	3	2	2
Environmental (High=3; Moderate=2; Low=1)	2	3	2	1	3
Social (High=3; Moderate=2; Low=1)	2	2	2	3	3
Political Planning Level (Local=1; Regional=2; Federal=3)	2	2	2	3	3
Total Vulnerability Rating (Sum of all factors)	12	12	12	10	14
RANK					
5 to 8 LOW					
9 to 11 MODERATE				✓	
12 to 15 HIGH	✓	✓	✓		✓